Minutes of the 107th Meeting

15-17 April 1998

Executive Summary

The U.S. Army Corps of Engineers Committee on Tidal Hydraulics (CTH) met in New York, NY, on 15-17 April 1998 at the request of the New York District.

The New York District staff briefed the CTH on several aspects of the Dredged Material Management Plan (DMMP) and the New York-New Jersey (NYNJ) Harbor Navigation Improvement Project. The plans include habitat creation and beneficial uses of dredged material. Disposal options include inshore sub-aqueous pits, regional sites in the lower bay, and man-made islands. Five demonstration sites have been completed and several private sector initiatives are underway. Upland CDF's are not a viable option because of lack of real estate. The New York Port Authority has the lead on Sub-Channel Pits as a subset of sub-aqueous pits. The District is preparing a Programmatic Environmental Impact Statement for contaminated dredged material.

The Waterways Experiment Station (WES), Coastal and Hydraulics Laboratory presented a summary of modeling work and prototype data collection efforts they are performing in support of the District. The WES Environmental Laboratory briefed the CTH on the ecological modeling and analyses they are doing in support of the District. The Port Authority briefed the CTH on various studies including economic analyses that they have underway. Moffat and Nichol Engineers presented the design analyses for manmade islands as part of the overall concept.

Several specific questions were posed to the Committee relative to the two projects. These questions were discussed extensively in the Executive session, and a formal report responding to the questions were prepared subsequent to the meeting.

Minutes of the 107 Meeting

15-17 April 1998

1. The 107th meeting of the Committee on Tidal Hydraulics (CTH) was held 15-17 April 1998 in New York, NY at the request of COL Gary Thomas, District Engineer, U.S. Army Engineer District, New York.

2. On 15-16 April, the CTH held Technical Sessions on several aspects of the Dredged Material Management Plan (DMMP) and the New York-New Jersey (NYNJ) Harbor Navigation Improvement Project. The CTH held Executive Sessions during the afternoon of 16 April and the morning of 17 April. All sessions were held at the New York District (NAN) Office.

3. Attendees were:

Committee on Tidal Hydraulics	
William H. McAnally, Chairman	Waterways Experiment Station
John H. Bianco, Liaison	Headquarters, USACE
Jay Combe	New Orleans District
Jaime Merino	South Pacific Division
Mike Palermo	Waterways Experiment Station
Ed Reindl	Galveston District
Ron Vann	Norfolk District
Chuck Wener	New England District
Consultants	
Frank A. Herrmann	Vicksburg, MS
Ray B. Krone	Professor Emeritus, University of California at Davis
Ashish J. Mehta	Professor, University of Florida

Other Corps of Engineers Representatives[1]

Bruce Ebersole	Waterways Experiment Station
Roselle Henn	New York District
Joe Letter	Waterways Experiment Station
James Lodge	New York District
Robert McAdory[2]	Waterways Experiment Station
Chris Rasmussen	New York District
Frank Santangelo	New York District
Tom Shea	New York District
Allen Teeter	Waterways Experiment Station
Robert Will	New York District
Bryce Wisemiller	New York District
Guests[1]	
Peter Dunlop	NY-NJ Port Authority
John Headland	Moffat & Nichol
Lingard Knutz	NY-NJ Port Authority
Peter Kotulak	Moffat & Nichol
Michelle Vargo	Moffat & Nichol
Tom Wakeman	NY-NJ Port Authority

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[1] Attended Technical Sessions Only
[2] Attended Friday Morning Sessions Only

4. The minutes are divided into discussions of presentations made at the Technical Sessions and actions taken at the Executive Session. The order of the minutes is not necessarily the chronological order in which these matters were considered at the meeting.

TECHNICAL SESSIONS

5. Mr. William H. McAnally opened the 107th meeting of the CTH at 0845.

6. Mr. John Sassi, acting chief of the Planning Division, made welcoming remarks on behalf of COL Gary Thomas, the District Engineer. He asked the Committee to evaluate New York District's Dredged Material Management Plan (DMMP) and the New York-New Jersey (NYNJ) Harbor Navigation Improvement Project.

7. Mr. McAnally introduced the Committee Members and guests and gave a brief overview of the CTH's purpose and history. He mentioned that the last time CTH met in NAN was 1961. Attendees introduced themselves.

8. Mr. Bryce Wisemiller made administrative announcements and added his own welcome.

Dredged Material Management Plan

9. Mr. Wisemiller (NAN) presented an overview of the DMMP. The objective of the DMMP is to develop a comprehensive management plan for the control and disposal of contaminated dredge materials for the Ports of New York and New Jersey which historically had been deposited offshore in the Mud Dump. About 4 million cubic yards have been classified as contaminated and can no longer be disposed in open water at the Mud Dump. The Mud Dump has been redesigned by the Environmental Protection Agency (EPA) as the Historic Area

Remediation Site (HARS) and is to be covered with uncontaminated dredged material. Components of the management plan include pollution prevention, stronger law enforcement, decontamination/treatment methods, use of dredge material to remediate upland sites, creation and restoration of aquatic and upland habitats, remediation of the Mud Dump site, and aquatic containment facilities. The study is to be completed by September 1998. (Attachment 1 shows the location.) He began with an outline of the progress report and provided copies of the report to CTH members. He then showed a map of the area and discussed plans to reduce contaminated material in the future. Manhattan College has developed a computer program to help compute ways to reduce sedimentation in the harbor.

10. Five demonstration sites have been completed and several private sector initiatives are underway. The plans include habitat creation and beneficial uses of dredged material. Other disposal options include inshore sub-aqueous pits, regional sites in the lower bay, and man-made islands. Upland Confined Disposal Facilities (CDF) are not a viable option because of lack of real estate. The New York-New Jersey Port Authority has the lead on sub-channel pits as a subset of sub-aqueous pits. The District is preparing a programmatic Environmental Impact Statement (EIS) for contaminated dredged material.

11. Discussion: The discussion revealed that this is not a long term project and, depending on the disposal option selected, will be completed in a few years. There are existing disposal sites available but some have limited capacity or are in litigation from environmental interests that want nothing placed in the water. The EIS addresses the Federal Project but the District has the authority to consider the total dredging in the harbor. The Corps has the responsibility for about two thirds of the material with the majority of the non-federal dredging belonging to NY-NJ Port Authority and New Jersey. Studies have identified two sites, Passaic and Upper Hudson River, as locations where dredging will get the most improvement per dredging dollar.

12. The Environmental Protection Agency (EPA) closed a disposal site and conducted a nine-month study to determine if it was an appropriate action. The outcome is uncertain. Challenges to EPA regulations, both locally and nationally, have been unsuccessful. The New York experience is different from many other Districts in that much of the material is contaminated. Even if point source discharges are controlled, it will be decades before the improving sediment quality will meet the current EPA criteria. During heavy rain events, there will be untreated sewage discharge. It is possible to trap the contaminated material but at a tremendous cost.

13. Mr. Bruce Ebersole (WES) gave a brief summary touching on the main modeling work being done at WES to support NAN. He began with an outline of the progress report and provided copies of the slides to attendees. The research tasks include:

- (1A): Wave Climatology, Storm and Non-Storm with Island CDF subset
- (1B): Storm Processes and Risk Analysis
- (1C): Sediment Transport Modeling
- (1D): Laboratory Experiments on Settling and Erosion Characteristics
- (1E): Harbor Apex Modeling (HAM)
- (1F): Near-Field Flow Modeling
- (1G): Water Quality Modeling to characterize oxygen demand (SOD and BOD)
- (1H): Analysis of Potential Shoreline Impacts
- (1I): Field Verification Current Profiling
- (1J): Initial Confined Aquatic Disposal (CAD) Pit Modeling
- (1L): Field Data Collection for a CAD Pit that exists and was dredged to mine sand

(2): Geographic Information System Support to DMMP
Populate database with data critical to site screening process: Screen/Evaluate potential CAD pits and island CDF sites based on physical, biological, chemical and institutional factors. Develop informative map products. Archive and maintain data used to screen and evaluate sites
(3): Geophysical Data Analysis
(4): Biological Studies
(5): Sediment Testing & Analysis
Characterize sediments by physical and chemical properties, determine contaminant pathways, determine disposal area cap effectiveness
(6): Sub-Aqueous CAD Pit Design
(7): CDF Design and Management
(8): Containment Island design – Physical-modeling
(9): Geosynthetic Fabric Container Studies
(10): Ecological and Human Health Risk Assessment
(11): CDF Bio-remediation
(12): Beneficial Uses of Reclaimed Material
(13): Sediment Reduction Evaluations Support
(14): Contaminent Reduction

14. Ms. Chris Rasmussen (NAN) discussed submerged aquatic pits and containment islands. She described 3 sizes and 2 shapes that have been culled from myriad proposed designs for the lower bay and open ocean. For containment islands, the architect-engineer has produced conceptual designs considering various fill rates, the use of interior partitions in the CDF's and various dike designs. These types of construction included sheet pile and rubble mound protection for the CDF's. The architect-engineer developing the design for sub-aqueous pits has as a sub-set, sub-channel placement and inner harbor pits. The design includes consideration of capping tolerances, methods, turbidity re-suspension impacts, outside testing requirements, excavation methods, rates of filling, disposal method, buffer zone above bedrock, and sedimentation rates.

15. Discussion: The contaminated island design is based on 75, 100, and 200-year events even though the environmental agencies have not specified a design period or event. They have not supplied any formal comments on the draft design documents circulated by NAN. The study team is trying to anticipate the questions that will come up as the studies progress but have no assurances that at the end of the design the environmental agencies will not ask for more.

16. Dr. Mike Palermo (WES) presented results from a study of disposal site islands. Using similar criteria, a site was selected for the lower bay, for the ocean, and for submerged aquatic pits. Collected data were entered into a GIS. Unsatisfactory areas were eliminated in the first cut, e.g., islands must be 2 miles from shore and the remaining acceptable areas ranked from best to worst, with zero being the lowest rating. Ranking factors include surface area, water depth, centroid of dredging, slope greater than 5 percent, etc. For an island alternative the long-term solution may be to design for a 20-year capacity. In the best areas, the bottom slope is about 1 percent. Modeling work fed directly into siting effort, e.g., wave heights and currents. Results are displayed as color-coded maps

17. Discussion: The modeling effort did not consider wave height in relation to water depth nor was sea level rise considered in the sea level data. Areas on the contamination map coincide with high fishing production areas. It was recognized that biological criteria are most difficult to identify and rate. The feedback from the environmental agencies indicate the desire for higher emphasis on biological considerations. Institutional factors, such as pipelines, cables,

commercial fishing, and distance from shore were considered   Ocean dumping rules don't specifically mention manmade CDF islands. Archaeological sites were not excluded since they could be mitigated. Past island creation uses were considered such as locating a pilot station on an island or establishing recreational sites. The selection of a specific site does not necessarily eliminate the others. Cost was considered indirectly based on water depth and wave climate, however, no cost analysis has been done. Disposal of dredged material costs 12 to 13 dollars per cubic yard in the bay and 25 to 30 dollars per cubic yard in the open ocean. Thus the first cost (in bay) is 100's of millions of dollars but less than the1 billion dollar ocean disposal cost. The ranking of physical and biological factors was 37 percent physical and 40 percent biological. Economics was a ranking factor of 7% for islands in the ocean. Some sites such as 2 and 3 straddle the New York – New Jersey state line.   The analysis did not consider commercial navigation or military installations that are not public knowledge. It was cautioned that military bottom-mounted installations may turn up when the maps are publicized.

18. Expanding on the selection process, Mr. Wisemiller indicated that green in the ocean is not equal to green in the bay. Submerged aquatic pits are located in areas no deeper than 50 feet, therefore there are no ocean pits. Thus for pits, the distance from shore was reduced for sites where a pit seemed appropriate, except areas where the depth did not meet the criteria. The depth at P1 is 20-25 feet and at P2 the depth is about 10 feet. Offshore depth is 80 feet. Currents were given different consideration for pits than for islands.   There was concern about the erosion of material from a subaqueous pit before capping. The 100-year event was not considered when designing the pits, instead the10-year event was used since the pit would only be open (uncapped) for a year. Since Pit 2 and a CDF island are in the same location consideration is being given to the idea of building an island over a filled and capped pit.

19. Mr. Ebersole described the storm modeling effort. Storm modeling, using ADCIRC, was performed to capture the effects of islands or pits on ambient waves and currents at each site. The telescoping grid of the ADCIRC model avoids the computational disadvantages of regular grids. After basic conditions were run, a truncated grid could be used. ADCIRC, a depth averaged model, was verified using an M_2 constituent tide with NOAA predictions. Using the Empirical Simulation Technique (EST), 20 extra-tropical storms and 20 tropical storms from a 100-year period were modeled to analyze extreme storm responses. The use of EST eliminates some of the assumptions from Joint Probability Methods. EST bases parameter relationships on those inherent in the data produced with a project total elevation frequency analysis.

20. Discussion: The purpose of the larger model grid was to generate nearshore data to provide boundary conditions for the ADCIRC truncated model. The global model is not really calibrated in the sense of tweaking knobs to get the tides to work. Rainfall was not used but river flow was.

21. Mr. Ebersole then described the wave climate and shoreline impacts efforts. A wave climate was generated to characterize wave conditions at potential CAD pit and Island CDF sites. This provided information needed to assess sediment losses during pit filling and storms. All available data and analyses were collected including wind measurements to hindcast waves using the Wave Information Study and wave measurements. The wind vectors were available from Ambrose Light, John F. Kennedy Airport, and Newark Airport. Measured waves were available from National Data Buoy Center (NODB) offshore wave buoy, the Coney Island wave gage and a project specific gage in Sandy Hook Bay. These data were used to help validate the model's ability to estimate waves in the lower bay. An attempt to use an Ocean Surface Current Radar system to map surface waves and current vectors was thwarted by vandals. The STWAVE model produced irregular waves for diffraction to determine sheltering and wind input. A 200-meter ocean grid, small inset 100-meter grid, and a third domain for local generation were used.

Typical annual ocean wave climate was modeled and compared with NODB data. Wave products included a design wave climate with significant waves, period of 8 to 20 seconds and local wave periods of 4 to 6 seconds. The potential impacts of the pit or island on the adjacent shoreline and, eventually longshore transport of littoral drift, were determined by computations with and without pits and islands. This information was used to develop maps of variance in wave height in the shadow of the island or pit.

22. Mr. Joe Letter (WES) presented the Harbor-Apex Model (HAM) work. The HAM grid was derived from the Passaic River Tunnel model study. The numerical model is CH3D-WES solving 3D Navier-Stokes equations and used the sigma stretch version with nine layers in the vertical. Boundary condition development included the following:

Long term tidal harmonic data
Global Bight Model for boundary conditions
Major river flows
Time history of river flow from U.S. Geological Survey (USGS)
Up to 29 inflow points in the harbor

Ninety-two separate model-screening runs of 1 month duration with autumn low flow conditions have been done to define general influences on circulation.

23. Lower Bay Inset Model verification included tides, currents, radar wave measurements, and ADCP data. It supports other DMMP tasks, e.g., input to design pits, such as producing tidal currents for pit erosion estimates and boundary conditions for near-shore field model. It has a rectilinear grid that can be conformally mapped to a checkerboard.

24. Mr. Allen Teeter (WES) presented information on near-field modeling around pits and islands. He described the models AKCESS for islands and MAC3D and LTFATE for pits and testing of sediments for model characterization.

a. AKCESS is a two-dimensional vertical finite element model. In this application the grid has 4400 elements and is bi-directional steady state (ebb or flood flow) or time stepped. Maximum velocity at the island was 5 to 12 feet per second. These results (and those from MAC3D) are to be used for assessment of habitat value.

b. MAC3D is a three-dimensional finite difference model with two horizontal dimensions with layers in the vertical direction. It uses steady-state tidal–peak flow.

c. LTFATE is a two-dimensional vertical finite difference model, which accounts for variable depths, currents, and waves. Conditions were reproduced for 20 extra tropical events and 20 tropical events representing 100 years of storm activity. Conditions simulated included P1 depths of 3, 6, and 9 meters below lip of pit and P2 depths of 1.5, 3, and 6 meters below lip. Three tide heights were employed for extra tropical events and 4 tide phases for tropical events. These tests were performed to determine the stability of sediments under severe weather conditions.

25. To develop information on erodibility of material three series of erosion experiments were performed. Sediment was slurried to 1.12-1.22 g/cc at 6 degrees Celsius and tested at 10 degree Celsius. Native sediment was used at different temperatures and with sand additions.

26. The erosion devices used were the PES (oscillating grid) and VOST (uniform flow water tunnel).

Sediment Characteristics

unit weight	1.364 g/cc
organic	7.2 percent
clay	28.0 percent
silt	53.0 percent
sand	19.0 percent

27. Settling time was more important to erodibility than was sample density. Thresholds of erosion increased from 0.15 to 0.5 Pa in 21 days. Erosion rate constants were about constant at 42 g /sq m/min.

28. Results for the insitu sediment (original sediment) were an erosion threshold of 0.37 Pa with rate constant of 1.5 g/sq m/min. The result of the VOST test was 1.7 Pa for erosion threshold and sand additions reduced erosion rate constants of sediment beds. Results for low temperature tests showed that low temperature reduced settling and consolidation.

29. Erosion of sediments during day-to-day pit filling operations was modeled with the COSED-IV-DMP model which handles cohesive sediment with multiple grain classes. Boundary conditions are obtained from STWAVE and CH3D. Deposit age was tracked.

DISPOSAL SCENARIO
240 day disposal cycle
5 million cu yd
Disposals from 4,000 cu yd barges
Disposal footprint 50,000 sq m
At site P1, 18 m deep, deposition height was 0.5 d
At P2 deposition height was 0.5d.
With a unit weight of 540 kg per cu m the amount eroded varied from 3.9 to 0.1% for site P1 and site P2, respectively for 100 acre pits.

30. Dr. Palermo presented lower bay CAD pit design considerations. Draft range-of-excavation depths ranged from 60 to 80 feet below MLLW. Sequence of pit building was: dredge the first pit, fill the pit, dredge a new (second) pit, place a preliminary cap on first pit with surficial material cut from the initial dredging of the second pit and then complete cap with clean material from bottom of second pit. Layout of pits for a particular location would swap locations, based on minimizing the mixing zone depending on tidal ebb and flood. Footprints for 60 acre and 100-acre pits are similar. Five years of disposal covers significant areas of bay. It is expected that about 15 ft of consolidation will occur within the pits over the long term. One viable plan encompasses building an island on top of the pit after about 20 years. Pits are oriented east west to align with predominant currents. Placement of barges to fill the pits is also covered in the report. The use of a hydraulic dredge with a surface or submerged diffuser is another alternative for dredged material placement in the pits.

31. Discussion: The sand layer (cap) was placed over the previously dredged material which had a density of 629 g/l, somewhat wetter than upland CDF material. Previous experience had cap placement immediately after placement of dredged material (pudding consistency). As the pit is the dirtiest part of the operation, it was uncertain how the model would show the placement

percentage loss. The Federal government set a 1/100 guideline for toxicity reduction but the state enforces a 137 times reduction criteria. At this time there is no regulation that would shut down the operation if some of the material settles outside the pit area. The purpose of the cap and design of the components is 2 feet for bioturbation, 2 feet for operational component (accuracy of placement) and 1 foot for isolation flux. It is expected that consolidation will halve the thickness in about 30 years to 40 years. The cap is intended to capture the contaminants from effluent.

32. Mr. Peter Dunlop (NY/NJ Port Authority) made a presentation on Sub-Channel Placement in the Existing Channel. The existing channel has a surface layer of contaminated material, which will be removed and placed in a CDF. The remaining clean material will be removed down to bedrock (below the authorized channel depth) and placed at the HARS. In channel areas currently experiencing deposition of contaminated material, they would like to place a cap, to avoid having the cap covered with contaminated material. In other areas, a cap would be placed using clean material dredged from the next in-channel pit. Since they are operating in Newark Bay, an impacted area, no cap is planned. They wonder if they can avoid sand capping and whether vertical sand drains to speed consolidation will be considered point sources of pollutants.

33. Discussion: Dr. Krone remarked that historically, every decade the channels are deepened another 5 feet. He questioned the wisdom of placing contaminated material under the channel. The reply was that the under channel placement was no worse than doing maintenance dredging throughout the area.

34. Mr. John Headland (Moffat and Nichol) presented inshore CAD and sub-channel placement. Five potential sub-channel sites: Bay Ridge, Red Hook, Hudson River Channel, Port Newark/Elizabeth Channel, Port Jersey Channel, Ward Point/Raritan Bay Channels; and four Inshore CAD Pit sites: Ward Point, Newark Bay, Constable Hook Flats, and Bowery Bay were discussed. The sub-channel sites have a capacity of about 4.5 million cu yd (mcy) and the pit sites vary from about 7 to 45 mcy.

35. Planning Design Issues included:

Geotechnical
Side slopes 3:1 or steeper for surficial sediments
Side slopes 3:1 or steeper for stiffer underlayers down to bedrock
Storage capacity depth to bedrock
Bulking
Consolidation
Placement method
Placement schedule/phasing
Environmental considerations
Water depth
Tides and currents
Winds and waves
Shipping activity
Sedimentation rate
Sediment quality
Existing sub-aquatic habitat
Dredging operations
Excavation (mechanical or hydraulic in contaminated and clean)
Filling (mechanical, bottom-dump scow or pump out)
Capping hydraulic

36. Discussion: When asked if it was permitted to place clean clay on a sand bottom or clean sand on a clay bottom, the response was one of uncertainty as EPA had not yet developed specific guidelines for the HARS.

37. Mr. Wisemiller concluded the day's presentations by discussing planning and design issues. These included:

Sediment fate during placement (STFATE) model
Placement method (bottom dump scow or down-pipe)
Capping
Placement techniques
Capping with adjacent material
When is capping necessary?
What is capping thickness criteria?
Maintenance and monitoring requirements
Critical factors
Placement method at HARS
Need/criteria for capping
Propeller wash for sub-channel placement
Dredging method for sub-channel placement

38. Discussion: The issue of sediment re-suspension from prop wash during ship passage was discussed. It was acknowledged that re-suspension of sediments by ship passage as well as natural events should be an important consideration. Failure of the model to recognize clumping impact on the spread of sediment is also a limitation. When questioned if placing material and dredging in the ship channel with navigation underway was a problem, the response was that dredges dig in navigation channels all the time, and the project must rely on scheduling and communications.

39. Mr. Dunlop described the advantages and disadvantages of under channel disposal and separate pit placement. The general disadvantages are: bedrock limits the depth of disposal, currents are higher, and it constrains future deepening of the channel. For pit placement the advantages are: quiet water and no ships, more lateral containment, larger volumetric capacities, and opportunities for environmental enhancement. The disadvantages are: an access channel is required, jurisdiction issues arise, and more complicated placement/phasing.

40. Discussion: When asked how long it would take to fill the pits, Mr. Dunlop indicated it was hard to say because the dumping fee seems to keep dumpers away. One has been open for 10 months and only filled 30,000 cubic yards.

41. The presentations and discussions for the day ended at 1700. The Technical Sessions reconvened at 0830 on 16 April 1998.

42. Two additional questions were added to the District's request for guidance on Sub-Channel disposal:

Should pit be capped or not?
Will EPA treat strip drains as point source?

43. Two additional question were added to the District's request for guidance on Islands & Pits:

What is an appropriate storm return period?
What are the relative risks of pit or island options?

44. Mr. John Headland continued his presentations with a description of the Lower Bay Ocean Island Confined Disposal Facility (CDF). The scope of work contains seven tasks addressing:

- Design Considerations
  - Island siting
  - Environmental impacts island hydrodynamics
  - Geotechnical conditions
  - Island capacity
  - Containment structure design
  - Operational aspects
- Engineering Siting Issues
- Geotechnical Issues
- Island Capacity
  - 50, 150, 300 million cubic yards for 50 years
- Island Shape
- Containment Structure Design
  - Principal dike feature
  - Overall geometry
  - Optimize design using economic analysis
- Environmental Enhancement

45. The preliminary findings indicated that rubble mound structures are feasible and a caisson for the ocean site is feasible.

46. Discussion: The island capacity does not include interior excavation (pits) before filling. The risk and consequences of island failures may result in the preference for rubble mound structures, which experience slow and repairable disintegration. Failure can be modeled and a secondary protection developed. Quantity can be calculated and the failure would not be total collapse. An emergency management plan to control material spill for the island may be needed. A 4,000 cubic yard spill cost the New York Port Authority 4 million dollars for clean up. A secondary line of protection, such as a sheet pile wall (redundancy) may be necessary to reduce the potential spill from a failure. The water in the harbor ranges from a minimum of 5-10 parts per thousand to very saline in low flow conditions.

47. There are risks and advantages of long-term uses of island sites for dredged material disposal. The management plan for the HARS has to match the options agreed upon by the Corps and NY-NJ Port. However, no more material will go to the HARS. The Corps and EPA may want to create a new ocean dump site as there is no regulation preventing such an action. For any pit construction, there is the need to coordinate the collection of data that may be relatively inexpensive to acquire. These data are necessary as design data for proposed pits. Other disposal options, such as construction material for fills and beach building, should be identified. Pipeline dredges can be used to build beaches as mitigation.

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New York/New Jersey Navigation Project Improvement Study

48. Mr. Shea (NAN) related the recent NY/NJ Harbor Navigation Study (authorized in 1996) history which included the following items:

Previous Navigation Studies and Projects
Vice President's Press Release & Tri-party Letter
Reconnaissance Phase
Feasibility Phase
Key Study Dates
Conduct Alternative Formulation Briefing July 1999
Draft Feasibility Report with Environmental Impact Statement Sep 1999
Final Feasibility Report Dec 1999
Modeling has two areas of effort
- Environmental (hydrodynamic, water quality, sediment and metals transport)
- Engineering (hydrodynamic, sedimentation)
- Navigation modeling will be included in design study

49. Discussion: Mr. Vann questioned whether or not the District should be addressing an option that is politically unacceptable. Mr. Shea replied that the DMMP costs have gone from $118 million in 1995 to $295 million in 1998. NY-NJ Port Authority's business-study cost $1.8 million. It considered the costs of inter-modal transportation with and without harbor maintenance dollars. There is ongoing a Hudson Navigation Study and the $2 million VTMIS study to make New York Harbor a model for the nation in terms of safe navigation. Another concern is the increasing ship sizes in the world wide fleet, e.g., Regina Maersk 1,100 feet long draft 47.7 feet and PNO Nebloid new ship 7,500 TEU's with 48.5 feet draft.

New York/New Jersey Navigation Channels Improvement

50. Mr. Frank Santangelo (NAN) presented engineering design and modeling aspects of the proposed NY-NJ Navigation Project Improvement. Apparently the pilots would like an additional one-foot of underkeel clearance. The studies will determine the channel depth, width, and alignment. The Ambrose Channel is currently 45 ft deep by 2,000 ft wide. Channel depths up to 60 ft will be considered.

51. Mr. Letter described modeling efforts. Modeling is to develop information needed to make engineering decisions. The approach will build on previous tools from the Passaic River Tunnel Diversion Study, NY Bight study, DMMP and South River Flood Control Project. Components of WES support include Wave Climatology, Navigation Conditions Analysis, Storm Surge Evaluation, Hydrodynamic and Sediment Transport Study, and the NY-NJ Navigation Survey. The purpose of the survey is to record wave-induced ship motion, provide data to compare with WES's vertical motion model, and provide guidance for depth requirements. Dual frequency units will be used with on-the-fly post processing. Also, four DGPS units will be required to operate simultaneously with identical recording rates. The DGPS units will access five satellites. Three onboard units will be on the vessel, one at the bow and two on stern at extreme port and starboard edges of vessel. The base station will require a long-term installation in a secure area to serve as a bench mark for onboard units. Recording rates of one per second will be used.

52. Discussion: The design vessel beam width is 140 feet for both container ships and tankers and data collection can be extrapolated to future ships. Ship motions in longer waves are quite large.

53. To save costs, researchers are going out with pilots, but need to set up very quickly to capture motions in the outer channel. At the same time the following work items need to be finished:

- Wave Climatology
  - Preliminary data support to ship motions study
  - Extend DMMP time series analysis to include 1993 – 1997
  - Develop impact of channel deepening on wave statistics
- Storm Surge Analysis
  - Expand stage frequency analysis to include locations critical to deepening study
  - Predict the impact of channel deepening on storm-stage frequencies
    - Tropical storms analysis
    - Extra-tropical analysis
- Hydrodynamic & Sediment Transport Model Study
  - Predict hydrodynamics in detail for the existing and proposed navigation channel conditions
  - Estimate the sedimentation rates/dredging requirements in the existing and proposed channel conditions
- Sediment Transport Models Available
  - CH3D-Sed: 3D non-cohesive sediment model
  - CH3DCESED: 3D cohesive sediment model
  - SED-2D: 2D cohesive/non-cohesive sediment model
  - RMA10-SED: 3D cohesive sediment model
- Sediment Transport Approach
  - Utilize previous sediment transport (SED-2D model) from Passaic Tunnel Project
  - Convert SED-2D mesh to RMA-10 3D (salinity aspect will not be used)
    - Add the capacity to handle non-cohesive sediment
    - Apply SED-2D/RMA10-SED to bar channel
    - Apply RMA10-SED cohesive & non-cohesive to interior channels

54. Discussion: There may be fluid mud in the channel but the bottom can be identified especially when it is bedrock. It is possible fluid mud exists in Kill Van Kull. There have been no complaints from surveyors or ship owners so it is probable the occurrence of fluid mud is episodic. It was mentioned that information on drainage basin hydrology was very poor. Sedimentation rate information was improving because of the added surveys. A best guess estimate is that peak events that cause sedimentation problems occur about every two years. To date there are no preliminary results on the effects of channel deepening. Questioned about seiching, Mr. Letter indicated that the flow from Long Island Sound through the East River was a most interesting phenomena. Everything is very sensitive to what goes on in the East River.

55. Relating to long-term data sets for model verification, it was stated that dredging records are being studied. Dames and Moore has gone through records and have made a data base lumped by navigation reach, like Kill van Kull, Raritan Bay, etc. One can look at pre-condition surveys but it is tedious to get specific data for finite reaches. It was stressed that a data collection plan should be started now as it is needed for the design phase. This is being addressed as the District Engineer expects to have it completed by October 1998. It was recognized that 3D modeling of

sediment transport is very complicated and that sedimentation is so varied only pre- and post-dredging surveys really tell you anything. To get good scientific data sets, data needs to be collected on a regular and uniform basis. The ongoing talks about data collection should include discussions with the WES modelers to ensure the correct data are collected.

56. This four-year study does intend to model the harbor area to head of tide. Mr. Letter showed the finite-element model resolution that is being developed for the study area. Dr. Mehta suggested an Eulerian framework to determine where to collect data. The plans include a terminal at the hook, which has been identified as a sediment trap, trapping sediment as a result of tidal currents. Salinity is not included in the study.

57. Mr. Headland described the proposed environmental modeling portion of the work. Overall objectives include:

Model Hydrodynamics & Water Quality aspects of the proposed deepening
EIS
FY 1998 Hydrodynamic modeling, and screen alternatives
FY 1999 Focus on preferred alternatives

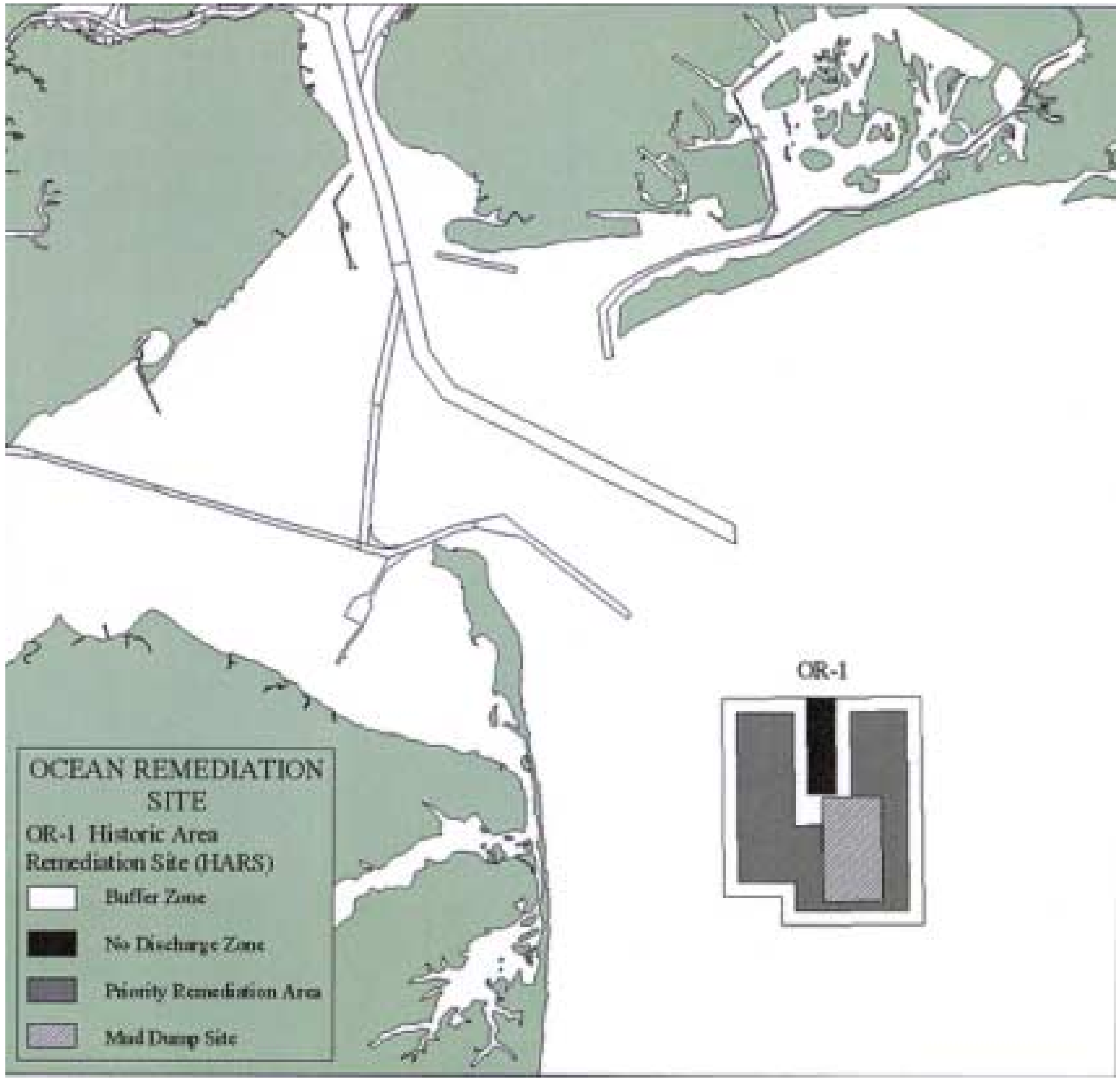
58. FY 1998 modeling objectives include developing hydrodynamic input for subsequent water quality modeling and providing fine grid resolution near deepened channels for easy incorporation of changes in channel dimensions and alignment. The modeling approach is to use the Danish Hydraulic Institute (DHI) MIKE models. The baseline (without project, future) channel depth conditions are: Port Jersey, 41 feet; Arthur Kill, 40/41 feet; and Kill van Kull, 45 feet. Five channel configurations for two representative flow conditions will be modeled

59. Simulations are based on representative tide flow and salinity boundary conditions rather than multi-seasonal or yearly time series. This is analogous to physical model tests. The simulation will use maximum, average, and minimum river flows. Representative runs will serve as the basis for screening alternatives. Links will be made between physical constituents, e.g. salinity and biologic factors to identify threshold levels. Assumptions are no new or expanded petroleum terminals. Potential container terminals sites include Red Hook, Brooklyn, and Port Jersey. Tasks include selection of model, definition of data requirements, and scheduling of FY1999 tasks. In FY1999, the PCB model and the DO model will be run for the preferred alternatives. The models will be checked for compatibility. Model approach will rely on existing data and will provide consistent results with existing models. Model will be calibrated and verified. Selected models include MIKE-21 (2D system), MIKE-3 (3D system), MIKE-3 (WQ), and Limited MIKE 3-hm heavy metals. MIKE 3 will model hydrodynamic features, tidal flows, stratified flows, flooding and drying of intertidal areas, rivers and outfalls (both sources and sinks), and heat exchange.

60. Discussion: The discussion centered around the contractor's use of the MIKE-3 model. Their main interest is to support NAN and they think MIKE-3 is easier for the District personnel to use. Delft and Wallingford have co-developed a finite element model. DHI and Wallingford sells models and assists the client in the application of the models. Delft emphasizes doing the work for their clients. The CTH has no problem with the MIKE-3 selection but stressed the importance of having a good modeler and good data. The model is using authorized depth plus advanced maintenance but the contractor was uncertain if it handled fluid mud, the equations would have to be studied to make that determination. The MIKE-3 models have not been compared to similar WES models as WES would have to purchase the model to make this comparison. The contractor has signed a confidentiality agreement with DHI and will abide by

the agreement. It was suggested that if the international community is more accepting of the MIKE-3 model, then perhaps the Corps should purchase and evaluate its use and application.

61. The discussion continued regarding the model time step and testing schedule. Z-level and sigma-stretching type coordinate transformation is used, however the question of how long to run the model to representative conditions for screening was raised – is thirty days sufficient? The contractor was cautioned to be aware of what the screening is for. If screening is for salinity using a uniform tide, the procedure may eliminate a project that, if run for a year using real tides, would not be eliminated. The contractor is trying to screen on short runs and then run for one year for the design alternatives. Five or six alternatives will be trimmed down as there is a need to keep on schedule. This crunched schedule is a result of Vice President Gore’s announcement setting the date at a press conference. There are several committees working with environmental problems and using several environmental models. This emphasizes the need to have good coordination between the engineering and environmental models. It is very likely that there will be numerous other environmental models that will come out of the woodwork and each having different results.


OR-1
OCEAN REMEDIATION SITE
OR-1 Historic Area Remediation Site (HARS)
Buffer Zone
No Discharge Zone
Priority Remediation Area
Mud Dump Site